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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
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In the Matter of Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95 RM-8811

REPLY COMMENTS OF INTELSAT GLOBAL SERVICE CORPORATION

Introduction and Summary

Intelsat Global Service Corporation ("Intelsat") submits the following reply comments in response to comments filed in the above-captioned proceeding.[1]

After reviewing the comments received by the Commission in this proceeding from the satellite industry as well as the terrestrial Fixed Service (FS) and Radio Astronomy Service (RAS) communities, Intelsat herein responds to certain comments made by DMC Stratex Networks, Inc ("DMC")[2], the National Academy of Sciences -- the National Research Council -- Committee on Radio Frequencies ("CORF")[3], the Wireless Communications Association International, Inc. ("WCA")[4], and Winstar Communications, Inc. ("Winstar")[5] that relate to

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[1] Allocation and Designation of Spectrum for Fixed-Satellite Services in the 36.0-43.5 GHz Band, 66 Fed. Reg. 35399 (July 5, 2001) (Further Notice of Proposed Rule Making) ("FNPRM").

[2] Comments of DMC Stratex Networks, Inc. (filed Sept. 4, 2001) ("DMC Comments").

[3] Comments of the National Academy of Sciences -- the National Research Council -- Committee on Radio Frequencies (filed Sept. 4, 2001) ("CORF Comments").

[4] Comments of Wireless Communications Association International, Inc. (filed Sept. 4, 2001) ("WCA Comments").

[5] Comments of Winstar Communications, Inc. (filed Sept. 4, 2001) ("Winstar Comments").

Intelsat's original comments.[6] Intelsat is in general agreement with the comments provided by the Satellite Industry Association ("SIA")[7], Astrolink International LLC ("Astrolink")[8], the Boeing Company ("Boeing")[9], Hughes Communications Inc. (Hughes)[10], Spectrum Astro Inc. ("Spectrum Astro")[11] and TRW Inc. ("TRW")[12], which mirror some of the points made by Intelsat.

These reply comments, similar to Intelsat's original comments, are grouped into four sections dealing with the FCC's proposal:

A. Designation Changes;

B. Allocation Changes;

C. Power Flux Density (PFD) Limits; and

D. Ban on Certain Satellite Stations in the band 37.5-40.0 GHz.

Discussion

A. Proposed Designation Changes

1. Re-designate Portions of Satellite and Wireless Services Spectrum[13]

All parties appear to agree with the proposed exchange of 1 MHz of designated spectrum between the FS and the FSS (*i.e.*, 37.6-38.6 GHz for 41.0-42.0 GHz) as part of the re-arrangement of the overall V-band spectrum. Intelsat additionally supports Boeing's suggestion that a better split of the total V-band spectrum is warranted in view of the new developments entering the FS industry.[14] Section A.1 of Intelsat's original comments provides further details on

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[6] Comments of Intelsat Global Service Corporation (filed Sept. 6, 2001) ("Intelsat Comments").

[7] Comments of Satellite Industry Association (filed Sept. 4, 2001) ("SIA Comments").

[8] Comments of Astrolink International LLC (filed Sept. 4, 2001) ("Astrolink Comments").

[9] Comments of the Boeing Company (filed Sept. 4, 2001) ("Boeing Comments").

[10] Comments of Hughes Communications Inc. (filed Sept. 4, 2001) ("Hughes Comments").

[11] Comments of Spectrum Astro Inc. (filed Sept. 4, 2001).

[12] Comments of TRW Inc. (filed Sept. 4, 2001) ("TRW Comments").

[13] *See* FNPRM at ¶ 15.

[14] Boeing Comments at 4-8.

how the bands should be designated, recognizing the current requirements.[15] The exchange of 1 GHz of spectrum between the FS and the FSS benefits both services as it provides 2 GHz of contiguous spectrum for FSS, which is essential for efficient satellite system design. Nevertheless, Intelsat urges the Commission, consistent with Intelsat's previous comments and those of others, to assure that this 2 GHz be fully useable by U.S. commercial FSS interests. Specifically, this spectrum block should not be hindered by the addition of new services on a primary basis, as contemplated by the Commission's proposal to upgrade the MSS in the 40.5-41.0 GHz band.

B. Proposed Allocation Changes

1. BSS Allocation in the 42.0-43.5 GHz Band[16]

Intelsat opposes the proposal made by CORF to delete the current Broadcasting Satellite Service (BSS) allocation from the 42.0-42.5 GHz band[17], which the Commission was planning to retain. In its submission, CORF indicates that the filtering required by the Radio Astronomy Services (RAS) to mask emissions of the BSS operating in its assigned band would be problematic. This contradicts the contributions of the United States and two other countries submitted to the ITU-R Task Group 1-7 on this issue[18]. These contributions indicate that filter rejection levels of 70 dB by the radio astronomy receivers are routinely used and suppression values of 120 dB are technically feasible. Indeed, Working Party 7D, representing the interest of the radio astronomy community within the ITU-R, in a subsequent document stated that the

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15 *See* Intelsat Comments at 2.

16 FNPRM at ¶8, Current and Proposed Non-Government Allocations and Designations Table.

17 CORF Comments at 1, 4.

18 *See* United States contribution to ITU-R Task Group 1-7/2, "*Draft Liaison Statement from TG 1/7 to WP 4A, WP 6S and WP 8D", dated 22 March 2001; Japan contribution to ITU-R Task Group 1-7/4, "Methodology for the Interference Analysis Between Transmitters and the Passive Service Operating in Adjacent Bands*", dated 23 March 2001; German contribution to ITU-R Task Group 1-7/7, "Working Methodology for the ITU TG 1/7 Band-by-Band Analysis -- Protection of Passive Service from Unwanted Emissions", dated 27 March 2001.

matter need not be studied within the ITU-R given the very high levels of suppression routinely achieved.[19] Furthermore, Intelsat agrees with Astrolink that the long-standing BSS allocation in the 42.5-43.5 GHz band, which predates WRC-92, should not be deleted and compatibility criteria should instead be developed.[20]

Intelsat takes issue with CORF's statement that the public interest is served by protecting the 42.5-43.5 GHz band for radio astronomy.[21] The Commission should consider that satellite networks provide an effective communication infrastructure in rural areas and hence directly serve the public interest.

2. Shift MSS Allocation from 39.5-40.0 GHz to 40.5-41.0 GHz[22]

In its comments, Winstar supports the proposal to shift MSS out of the band 39.5-40 GHz and to relocate it in the 40.5-41.0 GHz band.[23] This is consistent with Winstar's desires for unfettered use by the FS of the bands below 40.0 GHz. However, as stated in Intelsat's initial comments, this proposal has the consequence of crowding the 40.5-41.0 GHz band, thus virtually nullifying the benefit of a clear 2 GHz of access intended for the FSS in the band 40.0-42.0 GHz.[24] As the two services are not compatible on a co-frequency, co-coverage basis, the proposal could result in a loss of capacity in the band for the FSS. One possible alternative, as discussed in Intelsat's proposal, is the allocation of compensating spectrum at 42.0-42.5 GHz to the FSS, which should be feasible given the narrow beams likely to be utilized on the FSS satellites in this band.[25] An additional possible solution is to grant access to the FSS to all or part

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[19] ITU-R Working Party 7D Liaison Statement to Task Group 1-7/22, "*Draft Liaison Statement to WP 4A and TG 1/7 Concerning Characteristics of Radio Astronomy Receivers Relevant to the Rejection of Emissions in Adjacent and Nearby Bands*", dated 23 May 2001.

[20] Astrolink Comments at 7.

[21] CORF Comments at 4.

[22] *See* FNPRM at ¶¶ 22-23.

[23] Winstar Comments at 3-4.

[24] Intelsat Comments at 4.

[25] *See* Intelsat Comments § B.6 at 6-7.

of the band 37.5-38.6 GHz as proposed by TRW.[26]

In any event, Intelsat supports a secondary domestic allocation to MSS in this band, in line with the international table of frequency allocation in Section S5 of the ITU Radio Regulations.

3. Protect Radio Astronomy in the 42.5-43.5 GHz Band[27]

Intelsat would like to reiterate that the RR footnote S5.551G of WRC-2000[28], which the FCC is using as a model for its proposed domestic footnote, is still provisional and subject to review by WRC-2003.[29] Intelsat does not agree with CORF's strong support to enact a new domestic footnote based on S.5.551G.[30] Rather, Intelsat supports Astrolink's assertion that a decision on this matter prior to the completion of the work within the ITU would be both premature and lacking appropriate technical basis.[31]

Intelsat strongly opposes any modification to the current footnote, reflecting an additional 15 dB suppression of unwanted emission in the case of GSO satellites. First, such a modification would be inconsistent with the final acts of WRC-2000, where there was an international consensus to a provisional value that did not use the additional 15 dB constraint. Second, the additional constraint of 15 dB was waived by the Radio Astronomy community at a Working Party 7D meeting, provided the value of –167 dBW/m^2 in any 1 MHz band was entrenched in the regulations[32].

C. Proposed PFD Limits

1. Default Rule for PFD Limits[33] and FSS PFD Limits[34]

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[26] TRW Comments at 11-13.

[27] *See* FNPRM at ¶ 32.

[28] S5.551G provides a Power Flux Density (PFD) of -167 dBW/m^2 in any 1 MHz band in the frequency range 42.5-43.5 GHz at the site of RAS observatory.

[29] *See* Intelsat Comments at 6.

[30] CORF Comments at 5.

[31] Astrolink Comments at 3.

[32] ITU-R Working Party 7D Liaison Statement to Task Group 1-7/23, "*Liaison Statement to Task Group 1/7 and Working Party 7E -- Proposal for Addressing WRC-2003, Agenda Item 1.8.2*", dated 23 May 2001.

[33] *See* FNPRM at ¶¶ 36-38.

Regarding PFD limits, Intelsat does not agree with Winstar[35], DMC[36] and WCA[37], all of which support the implementation of the CITEL method of defining the maximum value of PFD under clear-sky conditions, while permitting the transmitted value to be increased under faded conditions up to the maximum value defined by Article S21. Intelsat supports the arguments made by TRW that the default rule for PFD limits should remain the current S21-4 PFD limits as approved by WRC-2000.[38] This is further addressed in § C.2 of Intelsat comments.[39] Intelsat additionally supports TRW's suggestion that any reduction in PFD per Resolution 84 should apply only to the United States[40].

With respect to the 12 dB figure in Resolution 84, the Commission should note that this figure is only tentative and is subject to the results of studies in progress at the ITU-R. The Commission is well aware of the trade-off between capacity, antenna size and costs, on the one hand, satellite e.i.r.p. on the other, as they relate to the operation of gateways in the bands below 40 GHz . It is, therefore, of fundamental importance that the Commission weigh the benefits of prematurely adopting a 12 dB value with the potential harm that it would cause to the FSS. Moreover, as discussed in Intelsat's comments, there is an additional reason for the Commission to await the results of the ITU-R studies. Specifically, if those studies were not to substantiate the 12 dB figure and a lower figure in Resolution 84 were adopted internationally, then the United States satellite communication industry would be at a competitive disadvantage.[41] As suggested in the conclusion of Intelsat's comments, should the Commission consider it necessary to urgently adopt a value before the ITU-R studies are completed, a small task force should be

[34] *See* FNPRM at ¶¶ 39-40.
[35] Winstar Comments at 5-6.
[36] DMC Comments at 2.
[37] WCA Comments at 3-4.
[38] TRW Comments at 22.
[39] Intelsat Comments at 8.
[40] TRW Comments at 7.
[41] Intelsat Comments § C.1 at 7.

convened to come to a final determination specifically for domestic application only.

2. Site Visibility:

In addressing the issue of link geometry, the WCA indicates that many earth stations may not be able to re-locate when it comes to avoiding interference from GSO satellite operations.[42] Intelsat would like to point out that overcoming site restrictions is a vital and required element of the services being considered in this band. To avoid blockages by buildings, the use of secondary hubs would appear to be needed as an intrinsic part of the design. The secondary hubs not only allow a greater coverage of metropolitan areas, they could also be used to avoid pointing toward the GSO. While a given system may choose not to incorporate such obvious features, that option should not be the basis for determining whether a 12 dB reduction or some other figure is appropriate, given scarce spectrum/orbit resources.

3. Winstar Comments -- Technical Attachments No. 1 and 2:

In an effort to support its arguments, Winstar has attached to its comments technical information for the Commission's consideration. Intelsat takes issue with much of this technical analysis, as described below.

- In Section V, Winstar indicates that in many instances there are limited sites for placement of equipment which consequentially does not allow for equipment relocation in order to avoid unfavorable geometries[43]. As discussed in Section C.2 herein on site visibility, at least in urban deployments, the system would intrinsically need to include redundancy techniques, such as the use of secondary transmitter site in order to have an effective coverage. The presence of a secondary hub reduces the number of impacted terminals, by allowing a means to reduce the number of in-line interference cases. This needs to be factored in in order to determine sharing constraints.
- Section V does not appear to mention, nor does it include in its calculations, the impact of

[42] WCA Comments at 3.

shielding of interference resulting from surrounding buildings and those upon which FS stations are installed.[44] This factor, if taken into account, would significantly alter protection requirements on a system basis.

- The elevation angle distribution provided is one of the most important data elements in the development of the PFD levels. Given the highly unusual distribution of sites with high elevation angles assumed in the analysis and the role this distribution plays in determining sharing criteria, the Commission may wish to carefully scrutinize this portion of Winstar's analysis.[45]
- An I/N analysis as portrayed in Figure 2 is a simplistic calculation that can be used as a first step in sharing studies.[46] Given the complexity of the deployed systems and the severe impact of fading in the 39 GHz band, a more thorough analysis that accurately establishes performance degradation than a simple I/N calculation is required. A methodology is currently under discussion within ITU-R Working Party 4-9S that would model the links of an FS deployment and determine the resulting availability both with and without interference. At the March 2001 meeting of Working Party 4-9S, U.S. proposals to approve a recommendation based on I/N alone were not successful and a more complete availability assessment was undertaken. Intelsat proposes that the FCC defer a decision on the PFD limit until ITU-R work in this regard is completed.
- In its document, Winstar presents in an attachment supporting a claim that there is no correlation between rain on the wanted and interference path[47]. However, the material presented is too limited, both geographically and in time, to generate such a sweeping

[43] Winstar comments at 12-13
[44] *See* Winstar comments at 12
[45] *See* Winstar comments at 14
[46] *See* Winstar comments at 14
[47] Winstar Comments Attachment No. 2 at 16-23, "*Analysis of Un-correlated Fading Events at 38 GHz and Impact on HDFS Operation by FSS Power Increase During Fading.*"

conclusion. Working Party 3M of the ITU-R dealing with propagation effects has provided comment on the issue and that material should be deemed as authoritative[48]. As mentioned by Intelsat in its submission, the work of the technical experts in the ITU-R should be allowed to conclude on the matter before the FCC establishes domestic regulations in this regard.

- The Commission may wish to consider the availability objective of 99.999% stated in the Winstar analysis and the WCA comments.[49,50] Such high objectives are directly responsible for the immense sharing difficulty presented by the Winstar system design. This availability is tantamount to an outage of about 5 minutes per year. Indeed, the American National Standards Institute (ANSI) standard for SONET digital services availability objectives for the access portion of the network is 99.95%.

  While it may be that other transmission systems, such as optical fiber, could provide the order of magnitude of availability quoted by Winstar, the Commission may wish to consider sharing criteria based on the ANSI service availability objective of 99.95%.

D. Satellite Earth Stations

1. Proposed Ban on Certain Satellite Earth Stations in the Band 37.5-40.0 GHz [51]

Intelsat opposes the comments of DMC[52] and others, which advocate not only having restrictions to prevent ubiquitous deployment of earth stations in the 37.5-40.0 GHz band, but also protecting High Density Fixed Service (HDFS) networks from gateway stations. Intelsat understands that the Commission's proposals to allow gateway operations in these bands would be in line with the internationally accepted norms on frequency coordination and ensuing

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[48] ITU-R Working Party 3M Liaison Statement to JWP 4-9S/118 and WP 4A/227, "*Working Party 3M Liaison Statement to Working Party 4-9S and Working Party 4A-- Satellite Downlink Fading*", dated 19 June 2001.

[49] Winstar Comments at 10 and 12

[50] WCA Comments at 3

[51] *See* FNPRM at ¶¶ 45-47.

[52] DMC Comments at 2.

recognition and protection. Intelsat also envisaged that non-gateway applications should also be allowed in the band on a non-protected/non-interference basis.[53] Intelsat believes that this proposal is reasonable and will result in the most efficient use of spectrum by FSS operators. As a consequence, Intelsat is strongly opposed to the specification of a minimum antenna diameter limit in this band.

Conclusion

As previously stated, Intelsat urges the Commission to defer any decision on PFD limits to a later proceeding that would be needed to address service rules and license issues, by which time the results of ITU-R deliberations would be known. Intelsat believes that because the development of both fixed services and satellite services in this band is in the early stages, it would be prudent to defer such far-reaching decisions. If, however, the Commission feels that a decision must be made prior to completion of the ongoing ITU-R studies, Intelsat urges the Commission to first arrange for an expeditious resolution of the pending technical sharing issues between the concerned domestic FS and FSS operators in this band.

Respectfully submitted,

INTELSAT GLOBAL SERVICE CORPORATION

Tony A. Trujillo, Jr.
Vice President, Corporate Services
3400 International Drive, N.W.
Washington, DC 20008-3006

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[53] Intelsat Comments at 9.